

he proceeded to Tobago—the dependency of the larger island—and here prosecuted his work under very adverse climatic conditions, with the result that on returning to Trinidad he was prostrated with a severe attack of malaria. After some four weeks' illness complications ensued, and he passed away on Sunday, July 17, from septic pneumonia following an operation.

John Bennett Carruthers, born in 1869, was the younger son of Mr. William Carruthers, F.R.S., until recently the keeper of the Botanical Department of the British Museum. He was educated at Dulwich College, the Royal School of Mines, and Griefswald University, Prussia. During this period appeared his first botanical contribution, "The Cystocarps of Some Species of *Callophyllis* and *Rhodymenia*" (*Journal Linn. Soc.*, xxix., 77-86), and "The Canker of the Larch" (*Journal Roy. Agr. Soc.*, 1891, Ser. iii., vol. ii.). A period as demonstrator in biology at the Royal Veterinary College, London, was followed by his appointment as professor of botany at Downton College, Wilts. Soon, however, he transferred his energies to the tropics, where his chief work was done.

In 1898 Carruthers went out under the joint auspices of the Ceylon Government and the Planters' Association to investigate a disease of cacao-trees. He proved successful, not only in ascertaining the cause of the disease, but in the frequently more difficult task of finding an effective remedy practicable under estate conditions. His successful work was recognised by his appointment in 1900 as mycologist to the Government of Ceylon and assistant director of the Royal Botanic Gardens.

In these days, when we regard a mycologist as necessary to any well-equipped agricultural department, it may come to many as a surprise that Carruthers's appointment, only ten years ago, was the first of its kind. He worked in Ceylon for five years, and in 1905 took up the directorship of the newly-formed Department of Agriculture for the Federated Malay States. Here he remained until he was invited to fill the Trinidad position, where it was expected that his special knowledge of cacao rubber and plant sanitation would prove of great value. These hopes have unfortunately been frustrated by his untimely death, but in the short space of time which intervened he initiated several important projects, and so recently as May contributed two papers to the Brussels International Congress on Tropical Agriculture and Colonial Development, whilst an account of rubber in Trinidad appears in the last issue of the *Trinidad Agricultural Bulletin*, of which he was joint editor.

Carruthers possessed the happy gift of "getting on well" with people, and officials and planters in many parts of the world, the members of the Royal Society of Edinburgh, the Linnean Society, the Association of Economic Biologists, the West India Committee, and a wide circle of friends unite in regretting his loss.

#### NOTES.

SIR E. RAY LANKESTER has been elected a foreign associate of the Paris Academy of Sciences in succession to the late Prof. Robert Koch.

The following men of science have been elected foreign members of the Royal Society:—Dr. Svante Arrhenius, Dr. Jean Baptiste Édouard Bornet, Dr. Paul Ehrlich, Prof. Vito Volterra, and Dr. August Weismann.

A REUTER telegram from Wellington states that a new crater is in eruption near the dormant geyser of Waimangu (Rotorua), and is ejecting mud and pieces of rock. Its proximity to the volcano of Tarawera renders the outbreak significant.

MR. JOHN RAMSBOTTOM has been appointed an assistant in the Department of Botany, British Museum. Mr. Ramsbottom was lately exhibitor of Emmanuel College, Cambridge, and Robert Platt biological research scholar, Victoria University, Manchester. He will devote himself to the fungi.

IN the course of a reply to a question asked in the House of Commons on Monday with reference to the Advisory Committee on Aërial Navigation, Mr. Asquith said that a further report of the committee will be laid before Parliament within a few days. Captain Murray Sueter, R.N., representing the Admiralty, and Mr. Mervyn O'Gorman, superintendent of the Balloon Factory, have been appointed additional members of the committee. The total approximate cost of the committee to the present date is 10,000*l*.

THE property in the centre of the Cheddar Cliffs, on which the quarry occurs that has caused much disfigurement to the gorge, has been purchased by the National Trust. Certain existing contracts, which expire in 1912, will be performed exclusively from the loose stone lying fallen in the quarry. No further blasting will take place. The National Trust hopes that by the purchase of this property the cliffs have been secured from all danger of further spoliation. The immediate and pressing danger to the finest part of the gorge arising from the vibration caused by blasting has now been stopped.

ACCORDING to a communication from Mr. J. T. Jenkins, published in the *Field* of July 23, there is reason to believe that the fur-seals on the Pribilof and other islands of the North Pacific are in imminent danger, if not of extermination, at all events of being so reduced in numbers as to be no longer of any commercial value. It will be remembered that the Anglo-American Commission of 1896 insisted upon the repression of pelagic sealing, and it was eventually agreed that, while this was to be absolutely prohibited to Americans, it would be permitted to British subjects only outside a sixty-mile limit from the Pribilofs. The Japanese were, however, no party to the arbitration by which this was arranged at Paris, and their vessels have for the last few years been actively engaged in pelagic sealing around the Pribilofs immediately outside the three-mile limit. In 1907 Canadians had fifteen vessels engaged in pelagic sealing, which took 5240 skins, while in 1908 there were eight vessels, which secured 4452 skins. On the other hand, the Japanese had thirty-six vessels in 1907 and thirty-eight in 1908, of which the respective takes were 9000 and 13,197. If the latter rate of killing be continued—especially when it is recalled that the great majority of seals killed in the open sea are females—it will not be many years before the herds will be practically annihilated. The case is one where international action is urgently demanded, and that at an early date.

AN article upon the character of King Edward VII. in the current number of the *Quarterly Review* gives much interesting information upon the early life and training of the late King. Queen Victoria and the Prince Consort appear to have considered the minutest details of the physical, intellectual, and moral training of their son, who was to become our King. The German blood and upbringing of the Prince Consort led him to attach great importance to thoroughness of educational training, while letters and notes "record the Queen's anxious solicitude that no boyish longing for excitement should interfere with the Prince's 'adherence to and perseverance in the plan both of studies and life' laid down by his father." Every hour

of the young Prince's time was mapped out by his governors and preceptors; and it is not surprising that under this high-pressure system, and without the stimulus of competition, the Royal pupil did not reach the lofty standard always before the mind of the Prince Consort. Every book was placed before the boy as a task, and the subjects in which he received instruction appear to have been presented in their driest form. Had more reasonable educational methods been adopted, and the Prince's individuality been considered instead of making it subservient to scholastic ideas, there would have been no occasion for the expressions of disappointment at his want of studious reflection. He was an acute observer, and could learn better from things than words. Even in his early days his teacher said of him that he was "learning almost unconsciously from objective teaching much which, I think, could never have been taught him subjectively"; and this capacity was his characteristic through life. While at Edinburgh as a lad of eighteen, he attended Lord Playfair's lectures on the composition and working of iron ores, and he never altogether forgot them. "They imparted to him a certain liking for practical science and its votaries which he never wholly lost." His interests were practical rather than academic, and his brilliant success as Prince of Wales and King was achieved not so much by his studies with tutors as in spite of them.

WE regret to announce the death of Mr. J. Ellard Gore, the well-known amateur astronomer, who did much to popularise astronomical science. While in the Public Works Department in the Punjab, he interested himself in scientific studies, and the result was the publication of "Southern Stellar Objects" (1877). From that date he was a voluminous writer on the descriptive side of astronomy, and his works have been welcomed on account of the general accuracy of his facts and the enthusiasm which his writings inspired. On double stars, variables, and planetary markings he was regarded as an authority. One of his noteworthy works was his share in the volume of astronomy which he wrote in the "Concise Knowledge" series in collaboration with Prof. Fowler and the late Miss Clerke. He was also well known for his translations of several of Flammarion's works.

THE processes of pottery-making as it appears in prehistoric interments in Europe is well illustrated by two contributions in *Man* for July, in which Mr. N. W. Thomas and Capt. A. J. N. Tremearne describe the methods in vogue in South and North Nigeria respectively. In neither district is the wheel used, the vessel being built up out of flattened ribbons of soft clay over the neck and shoulders of an old broken pot. Capt. Tremearne heard of, but did not witness, a still ruder method, in which the clay is shaped for the body of the pot in a hole in the ground, the upper portion being subsequently added in the way already described.

MUCH discussion has arisen regarding the date of the narrow cultivation terraces known in England as lynchets, and some authorities, like Dr. Mackintosh and others, have gone so far as to deny that they are artificial, asserting that they are merely natural raised beaches. Their contiguity to Neolithic and Bronze-age camps certainly lends much support to the view that they represent a form of prehistoric agriculture. Mr. W. A. Dutt, in *Man* for July, quotes an account of similar constructions in Abyssinia from Capt. Stigand's "To Abyssinia through an Unknown Land." The close analogies presented by these to the English examples are clearly in favour of the view that they are the work of a primitive race.

AN interesting phase of lacustrine culture is described in a monograph by Mr. S. A. Barnett, on the Klamath Lake and Modoc Indians of north-west California and southern Oregon, contributed to vol. v. of the *Memoirs* issued by the University of California. This specialised culture is largely based upon the use of the tule reed for hut-building, basketry, and other purposes. Their food is procured from the lakes on the shores of which they dwell, and for this purpose they use a peculiar duck arrow, fishing and bird nets, hooks of bone, and dug-out canoes. Stone implements, such as mullers, mortars and pestles, or mauls, are in common use. But many of these are relics of earlier Indian tribes, and their gradual disappearance before a culture based upon the use of metals is shown by the fact that they are now largely used as charms in medicine and gambling. A man, for instance, will take a large obsidian knife or spear-point, and, after reciting a charm, will place it under the mat on which a game is being played to ensure good luck. Fire is procured with a drill consisting of a piece of dry willow root twirled in a base block of cedar wood, for which purpose the canoe paddle is very commonly used.

UNDER the editorship of Messrs. W. M. Webb and E. S. Grew, *Knowledge* is much improved in general appearance, and, if we may judge from the July number, in the character of its contents. In one of the articles, the Rev. T. R. R. Stebbing urges that the gender of all generic names in zoology should be regarded as masculine, mainly on account of the difficulty of deciding as to the true gender of many of the terms now in use.

WE have been favoured with a copy of the report of the Danish Oceanographic Expedition during the winter of 1908-9, under Dr. J. Schmidt, published in *Geografisk Tidsskrift* (20, B.H. vi., 1910, pp. 243-55). The area surveyed extends from Iceland through the North Sea on the one hand, and along the eastern border of the Atlantic on the other, into the Mediterranean as far east as Greece. The report is illustrated with bathymetric tables of temperature and salinity in different parts of the area, and likewise with a chart of the isotherms and "isohalines" on the two sides of Gibraltar. The dissimilarity between the distribution of isothermal and isohalic areas in the latter region is very striking and curious.

DETERMINATE evolution in the colour-pattern of "lady-beetles" forms the subject of an elaborately illustrated memoir by Mr. R. H. Johnson, published by the Carnegie Institution of Washington (Publication No. 122). Lady-birds, to give these beetles their ordinary name, were selected for the purpose of this investigation on account of their abundance, the facility with which they can be reared in confinement, their distribution, and the circumstance that they were recently, and perhaps still are, in an active state of evolution. Members of the leaf-eating epilachnine group were chosen for special study as being easier to rear than the aphid-eating forms. As regards the object of the colouring of the Coccinellidæ, the author accepts the view that it belongs to the warning, or aposematic, type. No single pattern can at present be recognised as forming the ancestral type, and it is evident that Eimer's laws of pattern-development are inapplicable to the present case. "Natural selection, if at all active, is principally conservative of the spotted pattern. In spite of this, determinate variation, largely actuated by the effect of the environment on the germ-plasm, and probably preponderance as well, have accomplished marked evolution of the pattern from this condition. Evolution proceeds by waves as well as by

even flow and by mutation in different characteristics at different times."

IN the *Scientific American* of July 2, Mr. W. L. Beasley describes, with large-size illustrations, the method employed in the American Museum of Natural History, New York, of mounting the skins of large mammals on specially prepared models, or "manikins," which in some cases are based on clay statuettes of living specimens. After being roughly modelled, the manikins are carefully finished by artists, and the skins fitted upon them, the method being illustrated in the case of an East African zebra, or bonte-quagga, and a hippopotamus. The article specially relates to the collection of large mammals obtained by the expedition to East Africa under Mr. Roosevelt. The director of the museum, Dr. Bumpus, has planned a comprehensive and striking exhibition of African mammals, to be, in due course, displayed in the buildings under his charge. The main part of this exhibit is destined to be shown in a series of new halls about to be added to the west wing of the museum, but some specimens will be used to fill gaps in the existing series. The cost of the additions to the building is to be defrayed by Mr. Samuel Thorne, who has already done much for the museum. Unless funds are forthcoming for the addition of a new north-west wing to our own Natural History Museum, that institution will be altogether beaten by New York in the show of big-game animals.

THE July number of the *Selborne Magazine*, with which *Nature Notes* is now incorporated, contains an abbreviated report of the lecture delivered by Mr. J. Buckland on June 17, at the annual meeting of the Selborne Society, on the traffic in feathers and the need for legislation in connection with the same. To the same issue Mr. Buckland communicates an illustrated article on illegal practices in the feather-trade, dealing especially with India. It is pointed out that, in 1903, the Indian Government prohibited the exportation of the skins and feathers of birds, except those of domesticated species and ostriches, together with natural-history specimens. This prohibition, according to the author, is, however, to a great extent evaded by feathers being shipped as cow-hair, horse-hair, or silk material. One such consignment of "cow-hair" was opened by the custom-house officers at the London Docks in 1908, and found to contain more than 6000 parakeet-skins; but as these were not contraband, they were, after some delay, handed over to the consignee. Further investigation proved that, during a previous period of eight weeks, no fewer than twenty-three cases of bird-skins had been landed in London under false declarations. The author sums up as follows:—"A vast number of the feathers which are used in the millinery trade in Great Britain are able to be brought into her ports only by means of false declarations, which are a direct evasion of the law, and which declarations are made deliberately for the purpose of deceiving ship captains and the customs authorities of the countries from which the feathers are shipped."

THE fourth part of Bulletin No. 82 of the Entomological Bureau of the U.S. Department of Agriculture is devoted to an account, by Mr. W. B. Parker, of the life-history and the means of controlling the hop flea-beetle (*Psylliodes punctulata*), which has of late years done much damage to hops in British Columbia. The species, which is widely distributed over the northern United States, and ranges into southern Canada, normally feeds on rhubarb, sugar-beet, and a few other plants, and was not known as a serious pest until a few years ago, when it began to

devastate the hop-gardens in certain parts of British Columbia. When hop-cultivation commenced in the Chilliwack Valley in 1894, the beetle was noticed, but did little harm until 1903, when it appeared in force. From 1904 until 1908 the numbers of these insects gradually increased, attaining their maximum in the year last named. "As soon as the hops began pushing through the ground, the beetles were observed swarming around the vines, giving the soil in the immediate vicinity a black metallic appearance. These swarms of flea-beetles devoured the hop-shoots as fast as they appeared, and in places where the vines were a foot or more on the string the attack was so severe that in a few days the field looked as if it had been burned. The infestation resulted in a loss of about 75 per cent. of the crop."

THEORIES of life we have in plenty; it is somewhat a novelty to come across a pamphlet in which we have a theory of death propounded ("Das Altern und der physiologische Tod." By M. Mühlmann. Published by G. Fischer, Jena. Price 1.20 marks). The occurrence of physiological death is comparatively rare; most human beings die of accident, under which term disease is, of course, included; very few pass unscathed from such accidents, and die of simple old age, a gradual slowing down and final stoppage of life's machinery. But when it does occur, Dr. Mühlmann's theory is that it is due primarily to changes in the nerve cells, and that the run-down of the other organs is produced secondarily by changes in the ruling system of the body, the nervous system. Moreover, this degenerative change, which becomes evident to the microscope as a formation of pigmentary and lipid granules, begins quite early in life; from one point of view, therefore, it is a form of growth which produces death, and considerable importance is laid by the author upon granules in cells as an essential protoplasmic constituent. The brochure contains many interesting data, such as the rate of growth of the different organs in various periods of life, and this, together with his views on the phenomena of regeneration, will amply repay careful perusal.

A NUMBER of the *Bulletin du Jardin Impérial Botanique*, St. Petersburg (vol. ix., part ii.), is devoted to a paper on lichens by Mr. A. N. Danilov, in which he adduces morphological evidence opposed to the theory of a mutually advantageous symbiotic union of alga and fungus. In the summary the author states that his results confirm the evidence of Peirce and Schneider with regard to the close investment of the algal gonidia with a net of hyphal threads, and the complete absorption of the contents of the gonidial cells.

ARISING out of a demand from members of the Manchester Microscopical Society for specimens illustrative of marine zoology, a quarterly publication, the *Micrologist*, has been initiated by Messrs. Flatters, Milborne, and McKechnie, of Manchester, which will contain directions for manipulations of such specimens, and thereby take the place of instructions that would otherwise be required. The specimens will be issued quarterly with the journal, and mounted preparations will also be available for purchase.

A NEW volume—the fifth—of the Circulars of the Royal Botanic Gardens, Ceylon, opens with a report on the tea plots at the Peradeniya experiment station, and subsequent numbers deal with "Rubber in the Early Days" and a visit to a rubber factory. In the last named, Dr. J. C. Willis gives an account of a visit to the large factory in Hanover. With regard to the tea experiments, the chief



point is the proved value of green manuring, for which purpose *Erythrina* spp. (Dadap) and *Crotalaria striata* were found to be most suitable.

THE exhibition at Shepherd's Bush has naturally created an interest in the methods and craft of "Japanese gardens." Judging from an illustrated article in the July number of *Irish Gardening*, a typical and most successful example of such a garden has been laid out at the Tully nurseries, Kildare, which to those interested would certainly repay a visit. It is explained that such gardens are purely pleasure resorts, and therefore the practice displayed therein is entirely distinct from the methods adopted in ordinary and agricultural gardens, in which the Japanese are fully alive to the value of intensive cultivation.

THE first three numbers of the current volume of the Bulletin of the American Geographical Society contain a detailed examination of trade routes in the economic geography of Bolivia, by Prof. Isaiah Bowman. The author deals at length with the resources and population of Bolivia in relation to the natural features of the country, and concludes that, in spite of the fact that 90 per cent. of Bolivia drains to the Atlantic and 10 per cent. is interior basin drainage with no outlet whatever to the Pacific, nevertheless, geographical position and the distribution of resources and climate are here equally powerful factors with topography. The Atlantic slope, and not the Pacific slope, is, and will long remain, the back door to Bolivia; for the section of the country in which the population is found looks to the Pacific, and the first essential of all the trade routes is a short line to the coast.

MR. W. JOERG examines the present state of our knowledge of the tectonic lines of the northern part of the Cordillera of North America in a paper published in the Bulletin of the American Geographical Society (p. 161). Basing his discussion chiefly on the summary contained in the final volume of Suess's "Antlitz der Erde," the author suggests the recognition of the Alaskides, as a separate province of major rank, as a subdivision of the Cordillera. This would give three divisions: the northern Cordillera or Alaskides, the central Cordillera, and the southern Cordillera or Lower California and the Mexican Highland. The boundary between the first and second would be the zone of coalescence, and between the second and third the depression along Salton Sink, the Gila, and the Rio Grande.

THE director-general of Indian observatories has issued a memorandum, dated June 9, on the meteorological conditions prevailing before the south-west monsoon of 1910 (June to early October). Dr. Walker has pointed out that the rainfall in India brought by this monsoon is apparently affected by previous conditions over a large part of the earth's surface, and that it is only when these are strongly favourable or otherwise that a definite forecast is justified. One of the many favourable signs is, as a rule, the prevalence of high barometric pressure in South America and of low pressure in the Indian Ocean prior to the period of the monsoon. At Buenos Aires pressure was in excess in March, April, and May last, but in the Indian Ocean conditions appeared to have been, on the whole, slightly unfavourable. From these and other factors specified in the memorandum the inferences drawn are that there appears to be no cause for expecting a large excess or defect in the total amount of monsoon rainfall. The rains are likely to be less steady than usual, especially those due to the Arabian Sea current. Rainfall due to the Bay current is likely to be, on the whole, more plentiful by com-

parison with the normal than that due to the Arabian Sea current.

At the international meteorological conference at Innsbruck (September, 1905) Prof. Hellmann stated that the important question of the comparison of the barometers of the various meteorological institutes had engaged the attention of several conferences, but had not been solved in a satisfactory manner. Dr. Köppen also pointed out that so long as the differences between barometric standards are unknown, discontinuities arise when isobars are drawn for large areas. The conference finally arranged that the necessary work involved by such comparisons should be subdivided among the chief institutes, and the result of the part undertaken by the Prussian Meteorological Office is contained in one of the useful papers by Dr. Hellmann in the report of that institute for 1909. The comparisons of the standards at the central offices of the various German and some foreign systems show that at some stations (especially Potsdam and Zürich) the barometers agreed closely with the Berlin instrument, while others showed  $\pm$  differences of appreciable amount, the greatest being 0.246 mm. (nearly 0.01 inch). The larger differences are thought to be due to the mercury having become unclean; at all events, the results have justified the expense and care bestowed upon the somewhat laborious work.

WE have received separate copies of several papers by Prof. S. Lussana, of the University of Siena, which have appeared recently in *Il Nuovo Cimento*. One of them deals with the coefficients of compressibility and of dilatation with temperature of certain pure metals and alloys. The coefficients were measured by means of a dilatometer containing the material enclosed in a metal case. The change of volume was measured by the change of resistance of a platinum wire in the capillary tube of the dilatometer as mercury was forced along the tube by the contraction of the material. The values obtained allow the difference between the specific heats at constant pressure and temperature, respectively, to be calculated. For pure metals the difference increases as the temperature rises, but for alloys it in general decreases. In nearly all cases it decreases with increase of pressure. The bearing of Prof. Lussana's work on the improvement which has been introduced into the law of Dulong and Petit by the substitution by Prof. Richarz of the specific heat at constant volume for that at constant pressure will be obvious to our readers.

IN an article on the renewal of sulphated storage cells, reproduced from the *Electrical World* in the *Electrical Review* for July 1, Mr. J. O. Hamilton describes a method of dealing with such cells which has proved very successful at the Kansas State College. If on test the efficiency of a cell sinks to 50 per cent. or lower, the plates are removed and washed thoroughly with distilled water. They are then placed in a cell containing a 2 to 5 per cent. solution of caustic soda in water, and the charging current sent through the cell in the usual way. If the sulphate on the positive plate does not disappear in the time of the ordinary charge, and the solution gives an acid reaction with litmus paper, more caustic soda must be added to the solution, and the charging continued until the plate has the usual chocolate appearance. The plates should then be removed from the soda solution, well washed, replaced in the sulphuric acid solution, and the charging continued until gassing begins. Many cells have had their efficiencies raised from 25 to 75 per cent. by six hours' charge, and Mr. Hamilton considers that any cell which will still hold together will well repay treatment by this method.

*Terrestrial Magnetism and Atmospheric Electricity* for June contains an article by Dr. L. A. Bauer and Mr. W. J. Peters in which the complete magnetic results of the first cruise of the *Carnegie* are given. After an extensive series of tests of the vessel at Long Island, it was found that a determination of any magnetic element could be made on it with an absolute accuracy not far behind that attained by experienced observers on land. This conclusion was confirmed by further observations made at Falmouth at the end of the trip across the Atlantic. The observations made at sea show that the present charts of the Atlantic require revision, as they show compass variations which are in many cases more than  $1^\circ$  in error, and in some cases more than  $2^\circ$ . These errors appear to have been introduced by the application of a correction for secular variation at points at which no determinations of that quantity had been made. A further paper by Mr. E. Kidson deals with the observations of electrical conductivity and of radio-activity of the atmosphere made during the cruise. The conductivity was determined by means of a Gerdien apparatus, and always proved low in the neighbourhood of land, and persistently higher for positive than for negative electricity. At night the conductivity appears to be nearly constant, and about double what it is during the day. It will be seen that these observations are likely to render some modifications of the current theories of atmospheric electricity necessary. The radio-activity was determined by the negatively charged exposed wire method, the decay of activity of the wire being observed by means of an electroscope. It appears to be due to radium emanation and to be derived from the land.

A "SHORT History of the Academy of Natural Sciences of Philadelphia" has been prepared by Dr. Edward J. Nolan, recording secretary and librarian, and published by the academy. This sketch of the academy's activities is to be regarded as preliminary merely to a detailed history to be issued in connection with the proposed celebration of the centenary of the academy in 1912. The academy accomplishes its work in four departments—the library, the museum, the publication office, and the department of instruction and lectures. The library, exclusively for reference, now contains about 60,000 volumes, almost entirely on the natural sciences; in many respects it is the most important collection of the kind in America. It is claimed for the academy's museum that it is one of the most important in existence. The vertebrate animals number about 130,000 specimens, 12,000 being mammals, 60,000 birds, 20,000 reptiles, and 40,000 fishes. The insects are estimated at nearly 400,000 specimens, and the shells at a million and one-half. There are in the cases 50,000 specimens of fossils, 30,000 minerals, 20,000 pieces of archaeological material, and more than 600,000 preparations of dried plants. The remaining departments are equally extensive and enterprising. The academy has twice received appropriations from the State legislature, 4000*l.* in 1905 and 30,000*l.* in 1908.

A VALUABLE supplement to the meteorological observations undertaken by the University, Manchester, has been described by Messrs. Hayhurst and Pring under the title "Examination of the Atmosphere at Various Altitudes for Oxides of Nitrogen and Ozone," in the *Journal of the Chemical Society*. Previous estimates of the amount of ozone have ranged from 0.01 to 31.6 milligrams per cubic metre for the minimum quantity found, and from 0.03 to 158.0 for the maximum quantity, figures which appear to indicate a range of experimental error in the ratio of 3000 to 1. The very high values found by several

observers are no doubt due to the catalytic action of oxides of nitrogen upon potassium iodide solutions exposed to air, whereby a mere trace of oxide may act as a "carrier" of oxygen to an indefinitely large quantity of iodide; the similar action of sunlight in promoting oxidation of the iodide is also important as a further source of error. In the experiments now described, air was blown through bulbs containing potassium iodide either at ground-level or attached to kites or balloons; the bulbs were protected from light, and the presence of ozone was inferred, not from the mere liberation of iodine, but from the production of alkali and iodate. When this criterion was employed, it was found that whilst oxides of nitrogen were present in variable proportions, the amount of ozone at ground-level and at altitudes up to 8000 feet was less than 0.003 mg. in 1 to 10 cubic metres, or less than 1 part by volume in 4,000,000,000 parts of air. At very high altitudes, up to ten miles, small amounts of ozone were detected, the quantity found averaging 0.04 milligram in 0.1 to 0.3 cubic metre of air, or 1 part in 3,000,000 to 9,000,000 by volume. These experiments are of value as showing that the presence and merits of ozone in the fresh air of sea and country are as much a matter of fact as the substantial excess of oxygen which was discovered by over-zealous investigators prior to the researches of Cavendish; in fact, the only method of enjoying the effects of atmospheric ozone appears to be by ascending in a free balloon, which bursts and descends as a parachute after rising to a height of several miles.

COMMENTING on the Bournemouth Aviation Meeting, *Engineering* for July 22 remarks that perhaps the most interesting feature of the meeting from the technical point of view is the fact that all the best performances were done with aeroplanes fitted with the Gnome rotary engine. In fact, it seemed as if no machine which was not fitted with this engine had any chance of success. All engines of other types appeared to give trouble, and not to be able to furnish the desired power for any long time at a stretch. In some cases the trouble was hot bearings, especially big ends. In others the engine appeared simply not to be able to maintain its power, and, after flying a short distance, it could not sustain the machine in the air. The performances of the English engines were disappointing.

A NEW book by Dr. Berry Hart, of Edinburgh, entitled "Some Phases of Evolution and Heredity," will be issued very shortly by Messrs. Rebman, Ltd.

WE have received from Messrs. Friedlaender, 11 Karlstrasse, Berlin, a copy of the third part of a catalogue of entomological books and papers, this being devoted to Lepidoptera; also a catalogue of books on natural history, sports, travel, &c., offered by Mr. B. H. Blackwell, 50 Broad Street, Oxford.

MESSRS. SWAN SONNENSCHNEIN AND CO., LTD., will issue shortly a companion volume to Dr. Theal's "History of South Africa," to be entitled "The Yellow and Dark Skinned People of Africa." This will contain a summary of all that is included in Dr. Theal's "History and Ethnography of South Africa" (3 vols.), and is especially intended for the use of ethnographical students.

THE latest addition to the series of "Savants du Jour," published by M. Gauthier-Villars, of Paris, deals with the life and work of Prof. Émile Picard, of the University of Paris. Prof. Picard was born in Paris on July 24, 1856, and his biography, as here written by M. Ernest Lebon, shows a growing regard from his school-days for algebra and mathematical analysis, which eventually led in 1897 to



his appointment to the chair in these subjects in the University of Paris. The list of Prof. Picard's works and papers on mathematical subjects occupies a very large part of the memoir, which also contains an appreciation of his work by Prof. Henri Poincaré, delivered in 1888 in presenting him with the grand prize of the Paris Academy of Sciences for Mathematical Science.

THE first issue of a new annual, entitled "The Green Book of London Society," has been received. Its subtitle describes the volume as a directory of the Court, of society, and of the political and official world, including celebrities in art, literature, science, and sport, with many other subjects of current interest. The editors of the compilation are Mr. Douglas Sladen, who, it will be remembered, compiled "Who's Who," and Mr. W. Wigmore. Under science are given lists of some men of distinguished eminence in the London scientific world, with the researches and discoveries which have made them famous; the most important scientific and engineering institutions; and some of the chief scientific periodicals. The book runs to 487 pages, and is published by Messrs. J. Whitaker and Sons, Ltd., at 5s. net.

THE sixth edition, revised, of Dr. Bernard Dyer's small handbook on "Fertilisers and Feeding Stuffs: their Properties and Uses," has just been published by Messrs. Crosby Lockwood and Son, price one shilling net. Short descriptions have been added of the two new fertilisers—nitrate of lime and calcium cyanamide—in which atmospheric nitrogen is fixed, but the practical disadvantages of their use are pointed out. Of the former Dr. Dyer remarks:—"It has a serious practical disadvantage in its deliquescent property, which makes it necessary to sow it immediately the air-tight packages in which it is sent out are opened, and it cannot be conveniently sown in moist weather." Calcium cyanamide is also unpleasant to sow. Dr. Dyer's book is a manual from which practical farmers can obtain many useful hints as to profitable procedure in fertilising the soil for different crops and feeding the stock. The text of the Act of 1906, referring to fertilisers and feeding stuffs, is printed in full, together with the regulations of the Board of Agriculture and Fisheries for the protection of farmers from the supply of adulterated materials.

### OUR ASTRONOMICAL COLUMN.

#### ASTRONOMICAL OCCURRENCES IN AUGUST:—

- Aug. 2. 11h. 18m. Moon in conjunction with Venus.  
(Venus  $4^{\circ} 8' S.$ ).
8. 9h. 11m. Minimum of Algol ( $\beta$  Persei).
9. 6h. 26m. Moon in conjunction with Jupiter  
 $2^{\circ} 34' S.$
10. 12h. 46m. Venus and Neptune in conjunction.  
Venus  $0^{\circ} 27' N.$
- 11—13. Maximum of August Perseid display. Radiant  
 $44^{\circ} + 57^{\circ}.$
14. Venus. Illuminated portion of disc = 0.889.
16. Saturn. Major axis of outer ring =  $43.21''$ . Minor  
axis =  $13.51''$ .
25. 5h. 46m. Moon in conjunction with Saturn.  
Saturn  $1^{\circ} 18' S.$
27. 14h. 11m. to 14h. 54m. Moon occults  $\tau$  Tauri.  
(Mag. 4.3).
28. 10h. 53m. Minimum of Algol ( $\beta$  Persei).
30. 11h. Mercury at greatest elongation, E.  $27^{\circ}.$

SUBJECTIVE PHENOMENA ON MARS.—In No. 4427 of the *Astronomische Nachrichten* M. Antoniadi returns to the discussion of the objective reality of the dark band seen circling the Martian snowcap. He previously directed attention to the fact that this band was not visible on photographs of the planet, and suggested that its appearance during visual observations was simply an effect of

contrast. This argument was weakened by the possibility of photographic "spreading" in the sensitive film being sufficient to account for the obliteration of the dark band. But M. Antoniadi now points out that on the photographs taken with yellow screens during the last opposition, the caps are no more intense than the "continental" areas, and from this he suggests that "spreading" is negligible. Yet the dark band is not to be found on these photographs, and therefore, if the premises are true, it appears that its visibility in visual observations is only a subjective phenomenon.

THE GENESIS OF VARIOUS LUNAR FEATURES.—In the *Comptes rendus*, No. 2 (July 11), M. Puiseux discusses the probable origins of the circles and of the angular outlines of lunar crevasses shown in the polar regions of the moon on the concluding sheets of the great photographic atlas of the moon published by the Paris Observatory. He points out that many of the circles appear in chains, of two or more, parallel or perpendicular to the meridian. Where two of these circles intersect, the point of junction is marked by a small crater or a considerable elevation, and M. Puiseux believes that this is evidence against Faye's theory that the *bourellets* were formed by repeated periodic overflows which filled in the circle. Such differences of level as are now revealed would be incompatible with this theory. On the same plate (lxvi.) is seen a number of circles aligned on, or across, a meridian, and joined by a high, narrow ridge, and M. Puiseux considers that these are evidence against the meteoric bombardment theory.

Near the northern pole the geometrical contours of circles are exceptional, and angular features predominate. The ridges here are found to be in echelon, and M. Puiseux considers that the sharp angles were formed where previous ejecta prevented the eruptions from following the general line of weakness to which, however, the subsequent eruptions returned, thus producing the echelon form.

HALLEY'S COMET.—A preliminary account of the observations made by an expedition which journeyed to the Pic du Midi to observe Halley's comet is given in No. 2 of the *Comptes rendus* (July 11) by MM. G. Millochau and H. Godard.

Arrangements were made to photograph, regularly, the comet and its spectrum, but they were sadly interfered with by bad weather. No spectrograms were secured, but several good photographs were taken with a Zeiss "astrophotoplanar" lens having a large field. The photograph secured on May 29 showed a bright condensation, detached from the nucleus, which at  $2^{\circ}$  from the head became broader, and was prolonged some  $8^{\circ}$  into the tail. The photograph of May 31 shows a secondary nucleus at a distance of  $17''$  from the primary.

A long summary of the numerous observations made at different places during the passage of the comet is published in the July number of the *Bulletin de la Société astronomique de France*, and is illustrated by a number of drawings and photographs.

THE GNOMON IN ANCIENT ASTRONOMY.—All who are interested in the early days of astronomical observation will find an article by M. Jules Sagaret, published in No. 17 of the *Revue scientifique*, full of interest. M. Sagaret discusses at length the rôle played by the gnomon in the observations made by the ancient Chinese, Babylonians, Egyptians, &c., for the determination of time and season, especially of the solstices, and shows that in a vertical bamboo rod the Chinese of about the second century B.C. found a, comparatively, very effective astronomical instrument.

THE LEEDS ASTRONOMICAL SOCIETY.—The Journal and Transactions of the Leeds Astronomical Society for 1909 (No. 17) shows that this society is endeavouring to popularise the study of astronomy with its wonted vigour. In addition to numerous interesting papers read by members at the meetings of the society, there are a number of reprints of popular articles contributed to various publications. Among these are articles on current phenomena contributed by Messrs. Whitmell, Scriven Bolton, and Ellison Hawks, and a series of articles by Mr. Elgie which appeared in *T.P.'s Weekly* over the pseudonym "F.R.A.S."